GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

April Meeting and Elections to Fellowship. At the April meeting of the American Geographical Society held on the 25th of the month at the Engineering Societies' Building, 29 West Thirty-ninth Street, Mr. John W. Davis, late Ambassador to Great Britain, spoke on the history of the boundary between Canada and the United States. His address, which was entitled "The Unguarded Boundary," will be printed in the October number of the *Geographical Review.*

At the March and April meetings, President Greenough presiding, there were presented with the approval of the Council the names of 247 candidates who were duly elected as Fellows of the Society.

Award of the Charles P. Daly Medal to Sir Francis Younghusband. The Charles P. Daly Medal of the American Geographical Society for 1922 has been awarded to Lieutenant-Colonel Sir Francis Younghusband, President of the Royal Geographical Society. It has been forwarded through the Department of State for presentation at London by the American Ambassador. An account of the ceremony will be given in a later issue of the *Review.* The medal bears the inscription

Lieutenant-Colonel Sir Francis Younghusband
For explorations in northern India and
Tibet and for geographical publications
on Asiatic and African borders of the Empire

The American Geographical Society's Index to the Journal of Geography. Last January the *Journal of Geography* celebrated the twenty-fifth year of its foundation by the publication of an "anniversary number" containing articles on the history of geographical education in America in this period and the part played therein by the *Journal.* The Foreword is by Professor Davis, recognized leader in the movement that gave birth to the *Journal.* Professor Dodge, than whom through his long years of editorship no one has done more for the *Journal,* gives "A Glimpse of the Past." His successor, Professor Whitbeck, deals with "The Journal in the Field of Education," and Professor Brigham with "A Quarter Century in Geography" (see also his paper "Geographic Education in America," *Ann. Rept. Smithsonian Instn. for 1919,* Washington, 1921). Other phases of educational geography are discussed by Professors Goode, Fenneman, Jefferson, and Miller.

The aims and progress of the *Journal* have always been followed with a sympathetic interest by the American Geographical Society, and at a critical time in the history of the magazine publication was taken over by the Society (1919–1920). The *Journal* was then acting as official organ of the National Council of Geography Teachers, founded a short time previously. By 1920 this organization had advanced to the stage when it was deemed advisable to transfer the *Journal* to its auspices, and this was accordingly done with provision for substantial financial support from the Society until July 1, 1922. The Journal is now under the editorship of George J. Miller, Secretary of the National Council of Geography Teachers.

While the *Journal* was in the hands of the American Geographical Society it was planned to compile an index covering the entire series of volumes. This has now been completed and is published in co-operation with the National Council of Geography Teachers. The index extends over the 25-year period, 1897–1921, and includes the first five volumes which were published under the title "*Journal of School Geography*" and the two volumes of the *Bulletin of the American Bureau of Geography* (edited by Professor E. M. Lehnerts), which latter publication was merged with the former in 1902 under the present title. The index numbers some 150 pages and is prefaced by a historical and descriptive introduction. Examination of the index reveals the large body of valuable material contained in the volumes of the *Journal.* Started in a period of great enthusiasm for the "new" geography, the *Journal* has included among its contributors geographers of note at home and abroad and among its contributions

material of permanent value. Illustration may be taken from the first five volumes. These include articles by W. M. Davis on "Home Geography" (reprinted in the January, 1922, number of the *Journal*) and several physiographic subjects; by R. E. Dodge on "Life on the Colorado Plateaus" and several papers on the teaching of geography; by R. DeC. Ward, "Climatic Notes made During a Voyage Round South America" and "The Climate of the Philippines;" by E. C. Semple, "Influences of the Appalachian Barrier upon Colonial History" and "Indians of Southeastern Alaska in Relation to their Environment;" by A. P. Brigham, "The Eastern Gateway of the United States;" by Collier Cobb on "North Carolina" and L. C. Glenn on "South Carolina"; by J. F. Chamberlain on "Southern California" and C. F. Marbut on "Missouri"; by G. K. Gilbert on "Origin of the Physical Features of the United States;" by W. S. Monroe, "Geographic Instruction in Germany;" by Mark Jefferson on "Caesar and the Central Plateau of France;" by F. P. Gulliver on "Vienna as a Type City." Other contributors are C. W. Hayes, F. H. Newell, N. M. Fenneman, J. P. Goode, G. D. Hubbard, F. V. Emerson, and I. C. Russell. Of foreign geographers contributing to these first five volumes we have Douglas Freshfield, "The Exploration of the Alps;" Edward Heawood, "The Egyptian Sudan and its History;" A. J. Herbertson, "Geography of Scotland;" R. H. Mill, "The Development of Habitable Lands" (reprinted), and papers by L. W. Lyde, A. Silva White, and G. G. Chisholm.

A copy of the index will be sent upon request to Fellows of the Society and to institutions exchanging publications with the Society.

Joint Meeting of the Association of American Geographers and the American Geographical Society. The sixth joint meeting of the Association of American Geographers and the American Geographical Society was held at the home of the Society in New York on April 28–29. President Greenough of the Society called the meeting to order, and President Barrows of the Association presided. There was an informal dinner at the Belleclaire Hotel on Thursday evening, April 27, and a round table conference on "Methods and Problems in the Study of Land Utilization" on Friday evening, April 28. The conference was well attended. Among the guests were Secretary Wallace of the Department of Agriculture, Professor Gautier of the University of Algiers, Professor Brouwer of the Delft Polytechnic Institute, Holland, Mr. Mendenhall of the Land Classification Board of the U. S. Geological Survey, Messrs. Taylor and Baker of the Office of Farm Management, and Mr. Smith of the Forest Service. The conference ended with an appeal from Mr. Taylor for co-operation in solving land problems before the Department of Agriculture and the appointment of a committee of the Association with that purpose in view. The program of the meeting follows:

VILHJALMUR STEFANSSON: Colonizing the Lands Beyond the Treeline.
ALFRED H. BROOKS: The Future of Alaska.
H. N. WHITFORD: Present and Prospective Use of Tropical Lands and Tropical Forests as Illustrated by the Philippines.
OLIVER E. BAKER: The Problem of Land Utilization and Its Geographic Aspects.
CARL O. SAUER: The Problem of the Cut-Over Pine Lands of Michigan.
HUGH H. BENNETT: The Soils of the Southeastern States and Their Utilization.
ROUND TABLE CONFERENCE: Methods and Problems in the Study of Land Utilization.
E. F. GAUTIER: Native Life in French North Africa.
H. A. BROUWER: Physical Features of the Dutch East Indies.
C. W. BISHOP: Geographical Factors in the Early Culture Development of Japan.

Abstracts of all of the papers will be published in the next volume of the Annals of the Association, and several papers, notably those of Messrs. Gautier, Brouwer, Bishop, and Baker will be printed in the *Geographical Review.* Mr. Stefansson's paper dealt with problems already fully presented in the "Friendly Arctic" and in a later volume, to be issued in August, entitled "The Northward Course of Empire." Mr. Brooks' paper was illustrated by a series of maps giving the various distributional elements in the geography of Alaska.

Mr. Sauer's paper dealt chiefly with the political features of a local problem that in one way or another has vexed Michigan since the days of the great lumber barons. Mr. Whitford's paper, like those of Messrs. Baker and Bennett, was an excellent example of the geographic treatment of land use and soil problems in relation chiefly to agriculture. These three papers were also of interest as continuing the earlier work of Brewer, Hilgard, Whitney, Shaler, King, and others. The original quality of Marbut's geographical work on the Soil Survey, the recent work of Marbut and Shantz in Africa (to be published by the Society,

together with maps on the scale of 1:10,000,000, in color), of Jefferson in Argentina and of McBride in Mexico (to be issued as monographs in the Research Series of the Society) are other examples of the recognition of the importance of a study of land problems, including soils, in geographical work. It is important to emphasize the point of historical continuity in the development of the science of soil geography because of ill-founded and misleading assertions recently put forward respecting ignorance of the subject of soil geography among geographers and its representation in a college curriculum for the first time in 1921! The "new" in geography has become almost a fad, and we are apt to overlook the fact that the recognition of soils and of other land problems in the study of man is new only to those who have but newly "discovered" its importance. As a matter of fact we are but advancing a study first established in the United States by Hilgard before the Civil War ("Geology and Agriculture of the State of Mississippi," 1860) and given wide practical recognition in this country first in 1884 by Hilgard in "Cotton Production of the United States," a work which forms the fifth and sixth volumes of the final report upon the Tenth Census, and in later years, especially in the present century, by many others.

NORTH AMERICA

The Interior Forests of Alaska. A contribution to the much discussed subject of the future of Alaska's resources is made by John D. Guthrie in an article "Alaska's Interior Forests" in the April number of the *Journal of Forestry.* The interior forests present a problem quite different from that of the coast forests. The latter, included for the most part (90 per cent) as National Forests, are comparatively well known; they have played an important part in local development and have an undoubted future in export trade (see the note on Alaskan Forests in the *Geogr. Rev.*, Vol. 1, 1916, pp. 216–217). Knowledge of the interior forests is scant and incidental but sufficient for broad description and the formulation of a definite policy in regard to their exploitation and protection. These forests are entirely unlike those of the coast in size, density, and species of trees. They constitute a woodland type comparable to the forests of northern Maine and eastern Canada though inferior as to quality. It is estimated that they cover not less than 150,000,000 acres pertaining to the unreserved public domain and lying almost entirely within the basins of the Yukon and Kuskokwim Rivers. The most northerly limit of the forest in central Alaska stretches well beyond the Arctic circle—68° 50′. The average altitudinal limit of tree growth is 2,000 feet.

As a source of lumber the interior forests cannot compete with the coast, and, though the species are well suited to the production of pulp, transportation would be prohibitive. On the other hand it is urged that the forest resources are no more than sufficient for local needs should the mining and agricultural possibilities of the Alaskan interior be realized. Already in the region of Fairbanks there is a shortage of readily accessible timber for constructional purposes. This shortage is attributed in the main to fires, a particularly serious menace where an annual rainfall of less than 15 inches and summer days of 20 hours' sunlight render the forests highly inflammable. It is estimated that some 25,000,000 acres have been burned over already. Furthermore, reforestation is considered impracticable under the climatic conditions of the Alaskan interior.

A Superpower System for the Region between Boston and Washington. The signing of the armistice providentially delayed a rapidly approaching power famine in the northeast manufacturing district of the United States. That there is a problem of power shortage to be faced sooner or later in that district, however, as population and industry increase, is indicated by the rapidity with which the development of war industries absorbed the available power.

A survey of the resources and needs of the region has recently been made under the direction of W. S. Murray, and the report has been published as "A Power System for the Region between Boston and Washington," *U. S. Geol. Survey Professional Paper 123.*

The territory in which the survey was made—the "superpower zone"—lies between the thirty-ninth and the forty-fourth parallels of latitude and extends from the coast to approximately 150 miles inland, including parts of Maine, New Hampshire, Vermont, New York, Pennsylvania, Delaware, and Maryland and all of Massachusetts, Connecticut, Rhode Island, and New Jersey. One-fourth of the population of the United States is concentrated in this area, and in it are operated—mostly independently—315 electric utilities, 18 rail-

roads with 36,000 miles of single track, and 96,000 industrial plants. The zone has relatively small hydro-electric resources and maximum industrial power requirements. Close to it, however, lie some of the best coal fields of the country. The problem, then, is to conjoin the hydro-electric supply of energy with the steam-electric supply so as to produce a maximum of energy for a minimum investment of capital and a minimum operating expense and at the same time conserve the rapidly disappearing cheap fuels of the Appalachian coal fields. Figured on the basis of the increase in the use of power in the last ten years, the total energy required in the superpower zone for the year 1930 will be 31,000,000,000 kilowatt-hours, of which about 21 per cent can be supplied by water power. A co-ordinated system of generation and transmission is suggested, which, it is estimated, will be able to furnish this power at an annual saving of $239,000,000 over the present unco-ordinated system. The system recommended includes a plan for the generation of energy by steam at tidewater and on inland waters where there is a sufficient quantity of condensing water to be had, and also the utilization of all hydro-electric power that can be economically obtained from rivers within the zone or within transmission distance. The system is to be co-ordinated by 34 load centers for the distribution of the energy generated. The superpower system is urged not to supplant or even compete with the existing electric utilities but to co-ordinate and supplement them and thus to promote economy of generation and transportation.

Of interest in this connection are the new state power maps which are being published by the United States Geological Survey. These maps, on a scale of 1:500,000, show the location of power stations and transmission lines used in public service and the names of the public-utility companies. They are available for all of the New England states and also for New York, New Jersey, Maryland, Delaware, and the District of Columbia.

EUROPE

The Distribution of Cultivation in Sweden. The absolute dot method of representing geographical distribution employed so successfully by Sten De Geer in his population studies of Sweden ("A Map of the Distribution of Population in Sweden: Method of Preparation and General Results," *Geogr. Rev.*, January, 1922) has been applied to the agriculture of the country by C. J. Anrick in a map entitled "Area under Cultivation in Sweden." On the map (scale 1:1,000,000) each square kilometer of arable land is shown by a square of one millimeter side. The data are derived from the official statistics of Sweden 1913–1920. Accompanying the map is a well illustrated description of the method and results ("Beskrivning till karta över Sveriges åkerareal, with English Summary of the Contents," *Sveriges Geol. Under-sökning*, Ser. B a, No. 10, Stockholm, 1921).

The cultivated area of Sweden comprises 38,235 square kilometers of arable land and 480 square kilometers of gardening land. Of the area below the tree line 11 per cent is cultivated. In Götaland and Svealand (southern and central Sweden) the arable land amounts to 20 per cent. In some limited districts in southern Sweden more than 90 per cent lies under the plow. This highly varying intensity of cultivation is clearly shown in the map.

The extension and distribution of the arable land is largely determined by the natural conditions. In southern Sweden the climatic conditions are most favorable, and the number of the cultivable plants is greatest. The different kinds of soils and their distribution and the different topography are of fundamental importance. Of importance also are the historical development and the length of time an area has been cultivated. More than one-third of the cultivated land has been laid under the plow during the last fifty years.

When the last land ice disappeared from Sweden the lower parts of the country were submerged below sea level or were covered by lakes. In the late glacial seas and lakes clay, silt, and sand were deposited; and now these districts of sedimentation, after having been elevated, form the principal areas of agriculture. Of the land now cultivated 74 per cent lies below the late-glacial marine limit. Next to the sediments mentioned, till is the chief agricultural soil, though its value, of course, varies greatly according to its character. Peat soil also is of importance.

In Figure 14 and in Plate I the author gives a generalized map of the distribution of the arable land. In the plate he also depicts the extent of the cultivation of wheat, rye, oats, and barley.

E. Antevs

The Famine Belt of Russia. The original famine belt of Russia extends from the north end of the Caspian northward to central Russia and thence in a broad belt eastward beyond the Ural Mountains. In Figure 1, below, the famine belt has been drawn as represented in a report of the American Relief Administration by Professor A. C. Coolidge, published in April, 1922. Upon it have been drawn the boundaries of the rainfall belts, and they serve to show the transitional situation of these borderlands, where risk of crop failure and famine is inevitable in dry seasons. In the *Geographical Teacher* (Vol. 11, 1921, p. 141), Unstead has given the average rainfall and temperature of Samara over a long period in contrast to the conditions of 1921 as follows:

	Rain in millimeters			Temperature—Degrees C.		
	April	May	June	April	May	June
Average 1903–20 . .	27.0	38.8	46.9	6.4	16.2	23.7
In 1921	1.7	0.3	5.1	12.4	24.7	31.1

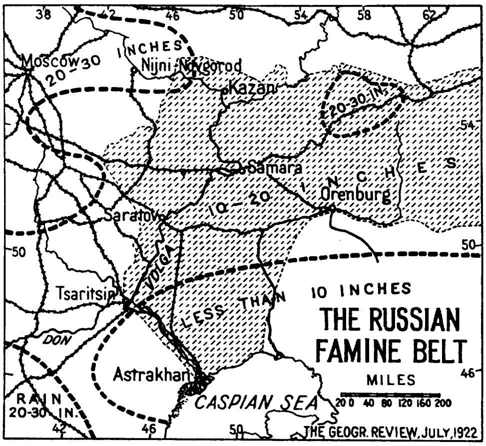

FIG. 1—Sketch map showing the famine area in Russia (shaded). Isohyets are added to show the "marginal" character of the Middle Volga basin, "naturally a rather poor grassland bordering an arid region."

It should be noted that though famine conditions first arose in the Samara region they have extended themselves over a wide district in the Ukraine, the Caucasus, and elsewhere. In the report of the American Relief Administration for May, Doctors Hutchinson and Golder report that: "In the eight or ten 'Governments' of Russia or the four 'Governments' of the Ukraine affected by famine, each one of which is comparable with the separate Transcaucasian republics in area and population, probably fifty per cent of the entire population is in serious want. In Georgia the percentage is not over two and one-half; in Azerbaijan, less than three and one-half; and even in Armenia, only twelve and one-half." They report further that contrary to the situation in Russia the lack of the Transcaucasian region is due to adverse political rather than climatic conditions, local wars interfering with ordinary agricultural pursuits. Armenia had deficient rainfall in 1921; Azerbaijan suffered from spring floods followed by hailstorms and a limited pest of locusts; and in Georgia early frosts in the fall of 1921 interfered to some degree with the autumn planting, and unusually heavy late spring rains prevented the proper ripening of the chief crop, maize. In spite of this, however, the average yield for the whole of Georgia was not far below normal. The chief difficulty in the relief of the Russians of the famine district is owing to congestion at the ports. It is impossible to evacuate food supplies as rapidly as they are received, and local congestion on the rail routes to the famine district further increases the delay. In continuation of this subject the reader is referred to the two following notes on agricultural conditions in eastern Europe and the historical geography of the Black Earth region.

Overpopulation in Relation to Agriculture and Famine in Eastern Europe. An exceptionally valuable analysis of the general agricultural conditions that underlie the state of famine now prevailing in eastern Europe is afforded by E. Dana Durand, former Director of the United States Census ("Agriculture in Eastern Europe," *Quart. Journ. of Economics*, February, 1922, Vol. 36, pp. 169–196). In his view the poverty of the masses is due "more to overpopulation than to any other one cause, if not more than to any of the other causes combined." Valuable comparisons are made between the density of population in the United States and those in Congress Poland, Galicia, and European Russia. It is shown that a far larger proportion of the population of eastern Europe is engaged in agriculture than is the case in the United States. Whereas, in 1920, 49 per cent of the population of the

United States was rural, in Congress Poland the figure was 68 per cent, in Galicia 80 per cent, and in European Russia 86 per cent. The number of rural inhabitants per square mile in the United States as a whole in 1920 was 17.3 (in Iowa, 27.4); in Congress Poland, 183; in Galicia, 213; in European Russia, 58; and in many sections of the country the rural density was from 100 to 150 per square mile.

Lacking industry to a high degree, eastern Europe with a very dense population must have a large part of its people work upon the soil. The result is a very minute division of the land to accommodate the individual farmer, and this division is enforced by scattered holdings absurdly small in size due partly to divided land inheritance generation after generation, partly owing to the subdivision and periodic redistribution of communal fields, and partly owing to the preference for land acquired by inheritance rather than land acquired by purchase because of a belief in greater security of title. Under these conditions a proper crop system cannot be maintained because the smallness of the holdings requires group action in sowing and harvesting crops. The alternative would require the individual to cultivate his tiny strip independently with tremendous loss of space and time. Farm animals are reduced in number to far below the level of efficiency, the low grade of living and the hopeless economic situation of the peasant conspire to foster primitive methods, and the consequence is that the average production of grain per acre is only little more than half as much in European Russia as in the United States, and the production per capita is far lower still. With his small holdings the peasant is required to consume the grain that he raises rather than to turn it into meat. Live stock is comparatively unimportant; there is a consequent lack of fertilizing manure; and the peasant is forced to be idle most of the winter, his productive efforts being confined for the most part to the crop season. The author wisely says that under these circumstances the export of grain represents an export from poverty and not from wealth of agricultural production. Its so-called surplus shown by export represents the contribution of agriculture to the state or to landlords in the form of taxes, rents, or profits of large estates. Even under these circumstances Poland had before the war hardly any net exportation of grain at all. Even in Rumania and Bulgaria, with less dense population, the greater part of the production of agriculture was consumed by the farming population itself.

The total effect of these circumstances was that agriculture was maintained in a state of delicate balance and that the peasant was almost always on the verge of want. The slightest accident might betray him. When war and revolution came with its reduction of agricultural output, its displacement of population in a region where industry had developed only in a limited way, disaster was bound to follow. Moreover, the city had nothing to give. The mining and manufacturing industries were more disturbed by the war than agriculture. The Soviet authorities followed the policy of requisitioning from the peasants their entire surplus and of suppressing entirely free trade of food. This was a blunder which had to be corrected. There was substituted a tax in kind, after which the producer was free to sell his grain. Added to these causes of disorganization was the lack of motive to produce. As a climax came the great drought in the Volga basin.

But if agriculture in eastern Europe has fallen, says Durand, it had not far to fall, and by the same token it has not far to rise again. By 1921 Poland, Rumania, and Yugo-Slavia were able to export food, though in small quantities, and there is promise of increase of efficiency in agriculture except in Russia. There, even if a stable government is soon established the recovery will take long because agricultural ruin has been more complete through the loss of machinery, tools, and draft animals, as well as the loss in confidence on the part of the peasant in any system of government. Added to these difficulties is the fundamental difficulty of the excessive density of the population which may affect all progress for decades and possibly for centuries. A large amount of labor exists but it is confined to small limits and is applied with a low grade of skill. Plowing methods are inadequate, and there is an improper rotation system and a wasteful practice of leaving land fallow every third year. Unless the people learn to restrict their numbers they may find it impossible ever to raise their standard of living, even with all of the large estates divided among them. Division of estates in itself will not solve the problem. The laborers on the estates must have their share. Some expense is necessary in equipping additional land, and though the large estates made up a large part of the total land area (in Poland 40 per cent) the large holdings include relatively small percentages of the total arable land (in Poland 25 per cent). The effect of the division of the land is to take away a source of irritation and to make possible a redistribution that will enable the peasant to consolidate his holdings

and make more effective the application of his labor. All this will necessarily involve the population in at least some confusion; and though the ultimate effect may be beneficial, the immediate effect is so small as hardly to bear at all upon the famine problem or the likelihood of its recurrence.

Steppe and Forest in the Settlement of Southern Russia. In connection with the present famine problem of Russia may be mentioned an extremely interesting paper read before Section E (geography) of the Edinburgh meeting of the British Association for the Advancement of Science (A. M. Gillett: A Sketch of the Historical Geography of the Black Earth

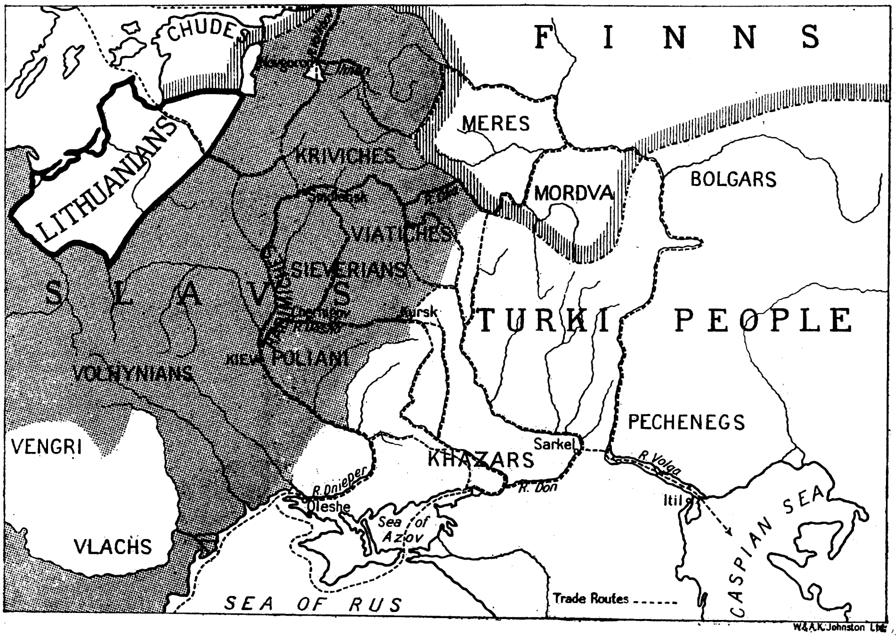

FIG. 1—Southern Russia in the ninth century, showing the peoples of Little Russia and the central Black Earth region. (Reproduced from the original drawing by the courtesy of the *Scottish Geographical Magazine*.)

Region of Central Russia, *Scottish Geogr. Mag.*, Vol. 38, 1922, pp. 1–10). The author considers as the pivotal fact of both early and later Russian history "that Russia is a plain open on the east by way of the Uralo-Caspian gate to the Asiatic influence which penetrated, almost entirely in the form of invasions of nomadic hordes, along the grassland route which led from the heart of Asia through southern Russia to the outposts of the steppe in Hungary." It was not altitude but vegetation that played the most important part. Asiatic nomads were confined to the southern steppe region; on the north they were limited by a belt in which the open steppe merged into forest. In this belt took place the struggle between the nomadism of the Tatar and the settled agricultural life that took root in the small clearings of the forest, where the Russian peasant had settled. The forest zone of northern Russia was occupied even in the centuries before Christ by a hunting and fishing people of long-headed Finnic stock, while the southern steppe zone was overrun by round-headed Asiatic invaders. The western neighbors of the Finns were Germans and Lithuanians; the Slavs were still concentrated on the eastern slopes and uplands of the Carpathians. The forest gave measurable protection to Slav and Finn alike, though the gradual advance of the Slav peoples caused a retirement of the Finns. The eastern Slavs were settled in the valleys of the middle and upper Dnieper "which from earliest times had served as the main north-to-south trade route across the western part of the Russian plain." Kiev as a trading town is located on the Dnieper at the point where the forests of the north merged gradually

into the southern steppe. The easternmost Slavs were a wild borderland people with the independent characteristics of frontiersmen. Their land was the battleground between the Slavs and the warlike steppe tribes, chiefly Tatar but with some Slav elements.

In the twelfth century the disruption of the Kiev community owing to social instability and nomad attacks developed two great streams of emigration: the one moved west to Galicia and Volhynia, which grew proportionately in importance; the other moved northeast toward the Oka and upper Volga, and the mixture of the latter stream of Russian colonization with the Finnish people resulted in the evolution of the Great Russian stock. Tatar invasions and supremacy from 1240 to 1480 delayed further colonization by both Great Rus-

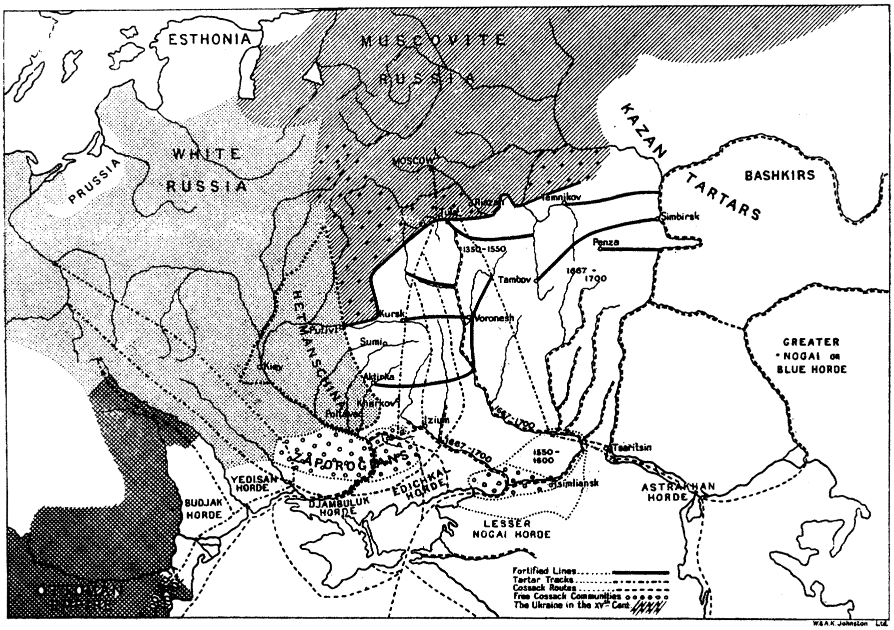

FIG. 2—Russia from the fifteenth century onwards, showing the advance of Great Russian colonization into the steppe. (Reproduced from the original drawing by courtesy of the *Scottish Geographical Magazine.*)

sians and Little Russians. When the Tatar yoke was thrown off in the fifteenth century there began a steady eastward territorial expansion preceded by Cossack outposts, which continued until the Russians stood at Port Arthur. Almost throughout the sixteenth century there was warfare on the southeastern frontier, where Tatar peoples continued to harass the Russian frontier. In the sixteenth and seventeenth centuries Great Russian colonization advanced behind the Cossack and a part of the scheme of defense was the construction of fortified lines designed to prevent Tatar penetration (Fig. 2). After the seventeenth century the Russian population increased in the steppe region by natural growth. In the eighteenth century all possibility of nomad raids was ended; Polish power declined. Cossack territory and Little Russia were included with the Moscovite Empire; the Don Cossacks were subdued. Settled life triumphed in the end. But, we may add, while it was a settled life it was still subject to catastrophes, like the present famine, that overtake the agriculturalist who makes his way beyond the border of the zone of safely habitable lands and takes his chances with the rain.

AFRICA

Boundary Settlement and Exploration in Wadai and Darfur. Wadai and Darfur have been two of the last of the African states to pass under European control. In all the Sudanese

countries the European has encountered a determined opposition that is in line with a development superior to that of other parts of tropical Africa. Infusion of Hamitic and Semitic blood in the negro races of the Sudan and the superior military and political organization gained through the adoption of Islamism encouraged here the growth of powerful states. Wadai under direct Senussi influence was in particular one of the most fanatical of Mohammedan states. In 1895 Keltie predicted that it would prove "one of the most difficult of all the African states to deal with," and the truth of his prediction was verified to the cost of France. Britain likewise owed her Sudanese troubles of the 80's to the Mahdi who started his disastrous career in Darfur.

It was after the defeat of the Mahdi's successor, the Kalifa, at Omdurman that France and Britain agreed upon the general disposition of the eastern Sudan (Convention of 1899): the Anglo-Egyptian Sudan was to include Darfur, Wadai to form part of French Equatorial Africa. Senussi influence soon provoked attacks on the French posts in Wadai, and the country was not pacified until 1912. It was during the military operations of 1909 that Lieutenant Boyd Alexander, the African explorer, was killed on the frontier. In Darfur quiet was maintained by a noncommittal policy, the while little confidence was placed in the Sultan, Ali Dinar, a caution justified by the events of 1915 when he threw in his allegiance with Turkey. "The difficulty lies not so much in fixing the frontier as in assuring respect for it when defined," wrote Frank R. Cana (Egyptian and Sudan Frontiers, *Contemporary Review*, May, 1914, pp. 688–797). The agreement of 1899 had definitively fixed the frontier south of 11° and north of 19° 30′. Between 11° and 15° the line was in principle that separating the kingdom of Wadai from the province of Darfur as it was in 1882, that is before the Khedive lost control of the Egyptian Sudan. But the ownership of the frontier country, especially the districts occupied by the Tama and the Masalit, was disputed by France and England. According to agreement of September 8, 1919, Dar Tama has been assigned to Wadai, Dar Masalit to Darfur (*L'Afrique Française*, Feb., 1920, pp. 55–57; *La Géographie*, Vol. 35, 1921, pp. 390–391). In the actual delimitation of the boundary on the ground it is provided that due regard be given to native rights—specifically in regard to water supply—and interests; and for the more northern portions the terms are elastic enough to meet the exigencies of an arid region occupied by scattered tribes whose customs and habitat are still very imperfectly known.

Settlement of the boundary question is a step towards realization of the possibilities of these lands which though semi-arid in the north are fertile in the south and offer great scope for agriculture proper as well as cattle breeding. Improvement of communications is another desideratum. El Fasher, the capital of Darfur, is 600 miles from Khartum, and the projected railway remains to be constructed for two-thirds of this distance; Abeshr is nearly as far from the forts of the Shari basin and exceedingly remote from any commercial center or market. Sir Philip Brocklehurst, who recently crossed Wadai from his frontier post in Darfur, describes the difficulties experienced by the French officials in obtaining stores at Abeshr ("Across Wadai," *Geogr. Journ.*, April, 1922). For the most part dependence has to be placed on Greek and Syrian merchants trading from Khartum. The road they travel—through Kordofan, Darfur to Abeshr—is now chiefly frequented by pilgrims making the journey to Mecca. In past times it figured as one of the great slave routes, the other being via the Kufara oases to Tripoli. With French occupation of Abeshr in 1909 the slave trade of which the capital had been the center ceased, and the town declined considerably. Another general cause of decline was the famine of 1914. The French authorities strongly urge construction of a railroad to link up the Sudanese countries. According to Sir Philip Brocklehurst the route along the pilgrim road from El Fasher through Wadai would offer little difficulty to such construction except in the mountainous portion of western Darfur. Here the line would run through a northern continuation of the Jebel Marra. Through Wadai the road runs through a generally level and scrub-covered country.

The Jebel Marra forms a part of the southeast-northwest trending watershed separating the Chad drainage from that to the Mediterranean, a belt of almost unknown highland regarding which our conjectures have been considerably modified as a result of Commandant Tilho's recent work in the Borku, Ennedi, and Tibesti regions north of Wadai (J. Tilho: The Exploration of Tibesti, Borkou, and Ennedi in 1912–1917, *Geogr. Journ.*, Vol. 56, 1920, pp. 81–99, 161–183, and 241–267). In particular he has shown that the mountains of Tibesti reach greater elevations—the highest peaks 10,700 and 11,200 feet—than was heretofore believed. Tilho, who continued his geodetic and topographic observations from these northern territories and established a liaison with the British work in Darfur, also ascribed a

much greater height to the unexplored summits of the Jebel Marra—9,000 to 9,800 feet instead of 6,000 feet. This mountain massif has more recently been penetrated by two British parties. In 1918 Captain H. F. C. Hobbs and Mr. J. A. Gillan ascended a peak in the southwest of the massif which altogether covers some 800 square miles and visited two lakes, the lakes of Deriba, previously known only by native report. The one lake, an object of superstitious awe to the natives, is regarded by them as an oracle. Ali Dinar is said to have sent messengers to consult it on the eve of his defeat by the British (H. F. C. Hobbs: Notes on Jebel Marra, Darfur, *Geogr. Journ.*, Vol. 52, 1918, pp. 357–363). In 1920 Captain H. Lynes and Mr. C. McConnel began a survey of the natural history of the massif, ascending from the same point as the previous expedition (*Sudan Notes and Records*, Vol. 4, 1921, pp. 119–137). They give altitudes for the massif on the order of those suggested by Commandant Tilho and much greater than are shown on Captain Hobbs' map. Thus the summit actually ascended was measured as 9,500 feet. This summit forms part of the rim of the great crater that constitutes the southwestern peak and rises at other points to still greater heights. The Deriba lakes lie within the crater—the salt lake on the floor of the main crater, the deep fresh-water lake within a more recent interior crater. Three biologic zones were recognized by Captain Lynes: the lower zone, up to 5,200 feet, characterized by vegetation of the thorny-prickly Sudan type; the upper zone, above 7,500 feet, which shows a marked change to temperate type; and between a sort of neutral zone. The lower slopes of the mountain are here barren and unpopulated, though the extent to which they are terraced indicates a formerly numerous population. The mountain people dwelling on the upper slopes are described as a shy, apathetic folk of low mental development. However, they live in well-built huts in fortified villages and are more advanced as cultivators than the people of the plains.

The Exploration of Mts. Kilimanjaro and Kenya. With the acquisition of the Tanganyika Territory (formerly German East Africa) the British have gained possession of Kilimanjaro, the highest mountain of Africa. Both of the great extinct volcanoes of East Africa, Kilimanjaro and Kenya, are now within the bounds of the British Empire. Kenya was ascended in 1899, and now Kilimanjaro has been successfully scaled by a British party. A brief account of the ascent made last October by four officials of the Tanganyika administration under the leadership of Mr. C. Gillman will be found in the *African World* for January 21, 1922, pp. 502–503, and in the *Geographical Journal* for May, 1922, Vol. 59, pp. 394–395.

The scientific exploration of Kilimanjaro, however, has been the work of the Germans. The first successful ascent was made in 1889 by Dr. Hans Meyer ("Der Kilimanjaro: Reisen und Studien," Berlin, 1900). Important investigations especially of the glacial features of Kibo, the main summit, were made by Dr. C. Uhlig in 1901 ("Vom Kilimandscharo zum Meru," *Zeitschr. Gesell. für Erdkunde zu Berlin*, 1904, pp. 627–650 and 692–718) and by Dr. Fritz Jaeger in 1904 (in company with Dr. Uhlig) and in 1906 ("Forschungen in den Hochregionen des Kilimandscharo," *Mitt. aus den Deutschen Schutzgebieten*, Vol. 21, 1909, pp. 114–146 and 161–197). More recently (1912) a party led and equipped by Eduard Oehler remained three months on the mountain carrying out topographic and scientific researches of the first importance. A photogrammetric survey was undertaken of the areas above an elevation of about 9,000 feet, and careful observations were made of the meteorology, geology, physical geography, and glaciers. A popular narrative of the expedition was given by Oehler in *Zeitschrift des Deutschen und Oesterreichischen Alpenvereins* (Vol. 46, 1915, pp. 124–156); the photogrammetric survey was described by Oehler's associate, Dr. Fritz Klute, in *Zeitschrift der Gesellschaft für Erdkunde zu Berlin* for 1921 (No. 3–4, pp. 144–151); and the scientific results of the expedition were discussed in an important monograph by Dr. Klute entitled *Ergebnisse der Forschungen am Kilimandscharo, 1912*, Berlin, 1920. The map on a scale of 1: 50,000 that was prepared from the photogrammetric survey accompany Dr. Klute's article and monograph.

The massif of Kilimanjaro, which covers an area of some 55 miles east and west by 35 miles north and south, was built by the action of three separate volcanoes along a line of structural weakness trending generally in an east-west direction. The slopes up to a height of between 11,500 and 14,500 feet coalesce and form one immense mountain mass culminating in the three cones of Shira (12,878 feet), Kibo (19,456 feet), and Mawensi (17,291 feet), the crests of which are separated by intervals of some ten miles. The crater form of Shira and Kibo, the western and central volcanic cones, may easily be recognized; but, owing to

the softer rocks which compose Mawensi, erosion by stream and ice has here progressed farther, producing a group of precipitous peaks.

From November to February Kilimanjaro is swept by the northeast monsoon: from March to October by the southeast trades. The summits of Kibo, Shira, and Mawensi rise well into the antitrades which here as elsewhere in this part of Africa blow from the northeast. The southeast trades are locally deflected so as to blow up the southern slopes of the mountain from the southwest. If Oehler's hypothesis is correct (it is accepted by Dr. Klute), this results from suction caused by the anti-trades passing through the gaps between Kibo and Shira and between Kibo and Mawensi.

The distribution and character of precipitation upon the mountain sides is determined in large measure by these winds, and in turn the details of surface morphology, glaciation, and vegetation cover depend upon the precipitation. In general it may be said that the highest parts of the mountain, like the steppes which surround it, are relatively arid. Maxima of precipitation are found at middle and lower altitudes, and in a belt of heavy precipitation which encircles the massif the greatest quantity of rain falls along the southerly and southwesterly slopes brought by the trades from the Indian Ocean.

Corresponding to the zone of greatest rainfall, a band of cultivated land encloses Kilimanjaro on all sides but the north, and at a higher elevation (6,200 to 11,800 feet on the south where widest) a girdle of primeval forest forms a complete circle. Dr. Klute believes that the lower border of the forest was determined by climatic conditions prevalent during a moister epoch. The forest once established, on account of its ability to retain moisture, has been able to maintain itself at a lower level than that at which it could establish itself under present conditions. Dr. Klute believes that the isolated patches of woodland now found in the cultivated area are remnants of a period when the forest extended even lower than it now does. Above the forest are grasslands, bushlands, and bare rocks; and on the summit of Kibo is an ice cap which sends out a row of small glaciers like fingers to the southwest.

The snow line is some 2,000 feet lower on the southern and southwestern sides of the cone than on the northern and eastern. The southerly side is not only less exposed to the dry anti-trades but is also open to moisture brought by the deflected southeast trades here blowing up the slope from the southwest. A study of the ice on Kibo led Dr. Klute to make some significant comparisons between the character of glaciation on volcanic cones like Kibo where the surfaces are convex and on mountains like the Alps that had reached a mature stage of dissection prior to the glacial period and where the surfaces are consequently concave. On the latter the snow and ice tend to converge into the valleys, here to accumulate to great depths forming cirques, and to flow off to much lower levels in long valley glaciers. On mountains of convex slopes the surface of the ice is greater in comparison with its volume, and the flow is divergent rather than convergent. Melting is accomplished more readily, and the lower limits to which the ice extends remain at a higher elevation even when climatic conditions are equal.

From a comparison of observations made by himself and others Dr. Klute asserts that the glaciers of Kilimanjaro have on the whole been receding during the past fifty to one hundred years but that this movement was interrupted during the first few years of the twentieth century when the ice front remained stationary. After 1906, however, recession was apparently resumed and, according to the reports of the English expedition of last October, has been in progress ever since (*Geogr. Journ.*, May, 1922, p. 395).

On Kilimanjaro, prior to the glacial period, well developed valleys had been excavated on Shira and on Mawensi. These became filled with ice during glacial times, and their upper extremities were converted into cirques. Cirques were also formed at elevations of 12,300 to 13,800 feet on the southern and southwestern exposures of Kibo, and a southwest-facing escarpment between Kibo and Shira shows that a series of semicircular glacial amphitheaters was occupied by small glaciers here, at approximately the same elevation.

From an examination of the terminal moraines of the glacial period Dr. Klute was able to trace successive stages in the withdrawal of the ice, but he could find no evidence of more than one distinct period of glaciation. The immense size of the cirques in comparison with the small stream valleys leading out of them seems to show that during the glacial period, as at the present day, the greater part of the run-off from melting ice was absorbed by evaporation. Glaciation then as now was developed on a vaster scale on the southern and southwestern sides of the mountain than on the opposite quarters. From this Dr. Klute concludes that the wind system of the glacial period must have been the same as that of the

present and that, if this be true, any shifting in the position of the poles or continents cannot be adduced as explanations of the incidence of the ice age.

From the human point of view Dr. Klute foresees an ever increasingly important rôle which the lowest slopes of Kilimanjaro are destined to play, despite their rain and clouds, as stations for sanitaria and refuges for convalescents from the more unhealthful coastal belt.

Kenya, lying approximately on the equator 210 miles to the north, still awaits thorough geographical investigation corresponding to that of Oehler and Klute on Kilimanjaro. In 1899 Mr. (now Sir Halford) Mackinder spent a month exploring the mountain and accomplished the first and only successful ascent of its highest point ("A Journey to the Summit of Mount Kenya, British East Africa," *Geogr. Journ.*, Vol. 15, 1900, pp. 453–486). During more recent years the Rev. Dr. J. W. Arthur has made five expeditions to the mountain but unfortunately has failed to reach the summit. The results of his explorations will prove of interest to both mountaineer and geographer (see J. W. Arthur: Mount Kenya, *Geogr. Journ.*, Vol. 58, 1921, pp. 8–25).

The height of Kilimanjaro—that is, of the highest point on the crater rim of Kibo called by the Germans "Kaiser Wilhelm-Spitze" and apparently not as yet rechristened by the British—was determined by Dr. Hans Meyer from barometric readings to be 6,010 meters (19,715 feet). This figure is probably somewhat excessive. The commission which surveyed the German-English boundary calculated the height by trigonometry to be only 5,890 meters (19,318 feet); and this is the figure which appears on the British General Staff map of 1915 (1:1,000,000). The Germans, however, claim that this represents the elevation of a point on the crater rim and not of the highest peak. Dr. Klute, from a combination of aneroid observations and from estimation, places the latter at 5,930 meters (19,456 feet), which is probably approximately correct (*Zeitschr. Gesell. für Erdkunde zu Berlin*, 1921, No. 3–4, pp. 148–149).

According to the British General Staff map of 1915 the height of Kenya is 5,195 meters (17,040 feet).

The Vegetation of Madagascar. The island of Madagascar is large enough and sufficiently varied in topography to afford conditions favorable for the development of many of the types of vegetation found on the adjacent continent of Africa. The prevailing southeasterly wind contributes to the maintenance of a luxuriant forest along the eastern slope of the island but since the watershed lies near the east shore there is a relatively small portion of the island, abundantly supplied with rainfall (see the relief map accompanying the article "Madagascar" by G. Grandidier, *Geogr. Rev.*, Vol. 10, 1920, pp. 197–222). On the northwest side of the watershed drought occurs following a rainy period sufficient to develop a good growth of grass. During the drought period this region is swept by fire, which not only prevents forests from invading the grassland but also pushes back the forests themselves where they come in contact with the grasslands. As on the African continent, a temperate rain forest extends along the top and down the east side of the watershed.

West of this forest region and extending around the south end and the north end as well is a region similar to the acacia-tall grass (low veld) areas of Africa where grasses predominate and where there are scattered trees. Fire destroys the grass almost every year and greatly limits tree growth. In the south and west the acacia-tall grass country gives way to a drier type similar to the thorn forest and acacia-desert grass areas of Africa. In the latter type fire is not a factor, since the growth of grasses is not sufficient to enable the fires to spread, and drought alone prevents the development of forests. Along the coasts there are mangrove swamps, and in the interior many marsh-grass areas.

Beginning in 1915 and continuing down to the present the Colonial Museum of Marseilles has published a notable series of botanical papers dealing with the French colonies. Of these, a number have dealt with the vegetation of the island of Madagascar. In a recent number Perrier de la Bâthie ("La végétation malgache," *Annales Musée Colonial de Marseille*, Ser. 3, Vol. 9, 1921) presents for the first time a concise picture of the vegetation of the island. The classification is unfortunately not based entirely on the vegetation itself. Division is first made into the original and the modified vegetation, and second, upon a climatic and physiographic basis the original vegetation is further divided into that found on the windward and that found on the lee side of the island. A map of the island shows the following types of vegetation: evergreen forest, deciduous forest, thorny brushland, mangrove, *savoka* (cut-over land), and prairie (burned-over grassland). On this map are

also drawn certain floristic lines separating different floral provinces, and two small maps give additional floristic data.

The original vegetation is now limited largely to the small area of forest which marks the east slopes of the watershed, forms a narrow strip in the south, but broadens out in the north and extends with many interruptions from coast to coast. Much of this original forest has been reduced to agricultural or cut-over land, and it now constitutes about 12 per cent of the area of the island. The brushland of the southwest is also regarded as of the original type, since here growth is not sufficient to enable fires to spread.

The greater part of the island—over fifty-one million hectares—is characterized by a modified vegetation which is classified under three main types, primarily according to botanical composition—the prairie, the *savoka*, and the mangrove. As a rule the number of species is small and a large proportion of the species are not endemic but are often world-wide in their distribution.

The prairie includes practically all the grasslands except the marshes, which are regarded as secondary. In this broad division are included both the luxuriant tall-grass prairies characterized by Andropogon and the desert-like short-grass lands characterized by Aristidas. These distinctions although not expressed on the map are of both economic and ecological significance.

The *savoka* is cut-over land which has partially reverted. Here are also included the early stages, represented by true ruderals which occur in cultivated fields or in fields recently abandoned, as well as the later stages in the succession leading to the re-establishment of the original forest.

The mangrove is also included in this section largely because it is characterized by a limited number of species. In fact the analysis here is based more largely on the botanical composition than upon the environmental conditions indicated by the plant types, and the grouping is therefore not well chosen to indicate crop potentiality.

The original vegetation is made up of a large number of species, many of which are endemic. This is divided on the basis of rainfall into the communities on the windward and leeward sides of the island respectively.

The vegetation of the windward side is divided into the eastern region,—a moist tropical region, the central region,—a region less moist and more temperate, and the region of Sambirano, warmer than the eastern region, but characterized largely by species from that region. The eastern region is characterized by high humidity and little change in weather during different seasons. In this region four formations are distinguished: (1) the littoral forest, largely developed on dunes and characterized by a low growth which produces construction timber, African ebony, and copal; (2) the marshes and lagoons; (3) the eastern forest, of complex botanical composition in which epiphytes are a prominent feature; (4) the mountain forests, constituting a type characteristic of exposed high mountains, where a large number of species occur and form a dense growth.

The forests of the eastern region are not readily destroyed by fire, but the greater amount of this forest has been cut and destroyed. Where reforestation takes place it passes through definite stages which must come in definite order and which require from 15 to 30 years to complete.

The central region comprises all areas above 800 meters and has a relatively temperate climate and less rainfall. Its limit is not well defined on the east but is relatively sharp on the west, where it is marked by the occurrence of deciduous trees. There are six formations in the central region: (1) the marshes, relatively abundant and characterized largely by sedges; (2) the dense forest, with herbaceous undergrowth, which lies between 800 and 2,000 meters elevation and represents a more temperate and somewhat less humid modification of the eastern forest; (3) the forest, characterized by an abundant lichen flora, which occurs only at high altitudes and is similar to the forests of the high mountains in the eastern part; (4) the ericaceous brushland, which also occurs at high altitudes where it represents the upper zone of vegetation on the island; (5) forests of the western slopes, relatively dry and very inflammable; (6) the rock xerophytes, where soil is denuded or thin and rock comes to or near the surface.

The formations of the central region are readily and rapidly destroyed by fire, and a few successive fires will reduce the forest to an Aristida prairie. In this destructive process the crests and ridges are first denuded, the other places retaining their original vegetation. In the next stage the forests occur only as small isolated clumps, and in the final stage the grassland replaces these isolated forests.

The remaining portion of the region on the windward side is discussed as the region of Sambirano. It is a small region on the northwestern side of the island where the forests of the east coast extend across to near the west coast. It differs from the remainder of the west coast in being much more humid and hotter. It contains forests of which three formations are distinguished, based on soil and topographic conditions as follows: (1) forests on alluvial land and at the edge of bodies of water; (2) forests on slopes and heavy soil; and (3) forests on sandy hills.

The vegetation of the lee side suffers prolonged drought periods. This part of the island is divided into western and southern regions. In the western region rainstorms and high temperature prevail for five months, followed by seven months of intense dryness. A large portion of this region occurs south of the region of Sambirano, and a small portion north which extends to the eastern shore some distance south of the north end of the island. In the western region six formations occur: (1) the raphia swamps, varying greatly in composition from pure Typha to palm swamps; (2) the alluvial forest, characterized by beautiful tall trees and little underbrush and distinguished from other formations of the western region by the abundance of lianas and by the persistent foliage; (3) the forests of the lateritic hills, consisting of small deciduous trees; (4) the forests of the calcareous plateau, characterized also by small or very large deciduous and thorny xerophytic tree growth in which Adansonia occurs; (5) the forests of the sandy hills, with xerophytic trees and bushes; (6) the xerophytic brushland, characterized by spiny and fleshy-stemmed plants such as Aloe, Euphorbia, etc.

The southern region is a xerophytic brushland, characterized by Didierea and other fleshy plants. Here fires cannot spread, and the vegetation can maintain itself against the encroachments of the prairie.

H. L. SHANTZ

ASIA

British Enterprise in Northern Baluchistan. From the days of Alexander of Macedon down to the last decade of the nineteenth century, the country bordering on the northern frontier of Baluchistan remained almost utterly unknown to Europeans. A barren district, much of it a true desert inhabited by predatory Baluch nomads, it lay far from the beaten tracks of commerce and of war. Only when British India began to fear Russian influence from the north was a concerted effort made to bring law and order into these regions.

Much of the success of British policy there is due to the work of Colonel Webb Ware, who in 1897 was placed in charge of the territory along the Afghan boundary by Mr. Hugh Barnes. Mr. Barnes, now Sir Hugh, had taken a prominent part in the survey of the boundary in the previous year and at the time was agent to the Governor General in Baluchistan. Under Colonel Webb Ware's management most of the native tribes, excepting the Sarhadi, were pacified; and a telegraph and caravan route was established from Quetta to Robat, near where the frontiers of Persia, Afghanistan, and British Baluchistan meet. Commercially this route offered an easy line of ingress for British trade to the markets of Khorasan. Strategically it strengthened the Indian frontier and offered a base from which military action might be taken against Afghanistan should the necessity arise. It also enabled the British to intercept the dangerous traffic in arms between the Persian Gulf and the Indian borderlands. So flourishing did the trading by camel over this route become, that in 1905 the government of India constructed a railway from Quetta to Nushki to obviate a difficult ascent of some 3,000 feet which the camels had to make on their journey eastward. Early in the World War German and Turkish aggression in Persia, together with a shortage of camels, induced the Indian government to extend the railway to a point halfway between Nushki and the Persian frontier, and its final completion to this frontier was determined upon immediately after the Russian debâcle in 1917 and completed in 1919.

The whole matter of the Nushki Railway with its historical and geographical setting was discussed by Colonel Webb Ware in a lecture which he delivered before the Central Asian Society (London) and which was followed by illuminating comment from Sir Hugh Barnes (*Journ. Central Asian Soc.*, Vol. 6, 1919, pp. 44–92).

The Sarhad is a wild, mountainous tract lying between Persia and Baluchistan. It has at all times been the haunt of lawless, intractable tribes. Not long after the opening of the

caravan route, Persian Baluchistan threw off all semblance of Persian authority, and raiders from the Sarhad carried terror and devastation throughout the greater part of eastern Persia. It is a testimonial to the order established in Baluchistan that, in spite of these raids, the trade route, "which lay within a single day's easy march of their tribal headquarters was never touched until the spasm of unrest which followed the opening of the war passed over the country in 1915." The story of the final subjugation of the Sarhad raiders in 1916 is graphically and informally related by Brigadier General R. E. H. Dyer in his book entitled "The Raiders of the Sarhad," London, 1921.

AUSTRALASIA AND OCEANIA

Some Recent Studies in the History of Australian Exploration. Though the main events in the history of Australian exploration have been recorded in easily available works, there still remain wide gaps in the record. Much attention has been devoted of late years by Australian geographers and historians to the filling in of these gaps, and the field is rapidly being prepared for the production of a history of far broader scope than any that has yet appeared.

Probably the best general introduction to published materials on Australian discovery and exploration will be found in those sections of the *Geographisches Jahrbuch* relating to Australia and to the history of geography from the close of the Middle Ages onward. These carry the student through the year 1908; but since that date investigation has been pushed forward vigorously, hitherto unpublished materials have been brought to light, reprints have been made from rare books, and many data previously uncorrelated have been gathered together in convenient form.

The whole question of the knowledge of Australia before the well authenticated Dutch voyages of the seventeenth century is highly treacherous and controversial ground upon which one must enter with caution. Some writers have even sought to associate ancient Greek speculations about vast southern lands with veritable knowledge of Australia, and an extremely dubious claim has been advanced in favor of the discovery of the western coast by the Frenchman, Paulmier de Gonneville, in 1503. There is a greater measure of probability in the supposition that the west coast may have been visited by the Portuguese and the eastern coast by the Spaniards in the sixteenth century (Ricardo Beltrán y Rózpide: Juan Fernández y el descubrimiento de la Australia, *Rev. de Geogr. Colon. y Mercantil*, Vol. 15, 1918, pp. 347–362).

The southern coast from Cape Leeuwin to the Nuyts' Archipelago was first explored by the Dutch in 1627 and was called by them Nuyts' Land. Ninety years later a curious proposal that this region be made the seat of a colony was presented to the Dutch government. The rare booklet of Jean Pierre Purry (1718) in which wholly theoretical arguments are advanced in favor of this scheme has been reprinted in part (*Proc. Royal Geogr. Soc. of Australasia: South Australian Branch*, Vol. 19, 1917–18, pp. 102–108). Purry maintains that because the Land of Nuyts lies "in the 5th climate, between the 30th and 36th degrees of latitude," and because the best and most fertile countries both of the Old and of the New World lie between these same parallels, that therefore the Land of Nuyts must be rich "whether in cheese, wine, olives, tobacco, or, chief of all, silkworms." Subsequent explorations by sea and land, however, have revealed this coast and the country behind it as among the most desolate and inhospitable regions in the world.

A useful summary of early voyages along the southern coast was given by the Hon. John Lewis in one of his annual addresses as president of the South Australian Branch of the Royal Geographical Society of Australasia (*Proc., etc.*, Vol. 19, 1917–18, pp. 1–95). By all means the most fruitful of these explorations was that of Captain Flinders in the *Investigator*. Flinders accurately surveyed the shore line and discovered the two great bays, Spencer's Gulf and the Gulf of St. Vincent, that penetrate far into the interior of South Australia. Full extracts from Flinders' detailed journal were given by President Lewis in the address just referred to and in that of the following year (*Proc., etc.*, Vol. 20, 1918–19, pp. 1–67). The best known incident of the voyage was an unexpected encounter south of Kangaroo Island with the *Géographe*. This vessel and the *Naturaliste*, both under the command of Captain Baudin, had been sent out by Napoleon Bonaparte to explore these southern waters. Though the Peace of Amiens had been concluded less than a month before, for all Flinders and Baudin knew, France and Great Britain were still at war.

Flinders, none the less, ventured aboard the French vessel, was received with courtesy by Baudin, and exchanged geographical information with the French commander. Subsequently Flinders was careful to preserve upon his maps names given by Baudin to points along the coast, and in 1913 the continued use of several of these names was officially approved by the South Australian government. On the other hand the official accounts of the French expedition written after the death of Baudin tended to deprive the British navigator of the credit due him for his pioneer work.

Though the first British settlement in Australia was made in 1788 at Sydney, the escarpment of the Blue Mountains to the west with its remarkable series of "bottle-neck" valleys for many years placed an effective obstacle in the way of exploration and expansion into the interior (see Griffith Taylor, *Geogr. Journ.*, Vol. 53, 1919, p. 177). During the infancy of the settlement at Sydney, a rumor became widespread among the convicts of the presence of a colony of white people some 150 or 200 miles back in the country. In 1798 two journeys were made under the command of Governor Hunter to investigate this rumor. Needless to say, no white people were found, but the district southwest of Sydney up to the mountain barrier near the site of the present city of Goulbourn was penetrated for the first time. The diaries of a young man who took part in these journeys have been recently printed and discussed in detail by Mr. R. H. Cambage ("Exploration beyond the Upper Nepean in 1798," *Journ. and Proc. Royal Australian Hist. Soc.*, Vol. 6, Part I, pp. 1–36). Not until the second decade of the nineteenth century, however, were more extended explorations undertaken on both sides of the Blue Mountain barrier and upon the plains to the west. In another interesting paper Mr. Cambage outlines and summarizes several significant journeys that were made at this time ("Exploration between the Wingecarribee, Shoalhaven, Macquarie, and Murrumbidgee Rivers," published by Royal Australian Hist. Soc., July 26, 1921).

The discovery of the great River Murray and the first passage overland from New South Wales to South Australia were made in 1829–1830 by Charles Sturt, who was later to open the way into the heart of the continent. Mr. Lewis, whose interest in the historical geography of Australia has been unflagging, in another Presidential address, dealt at length with the explorations of Sturt and others in the vicinity of the Murray and with early navigation on that stream (*Proc., etc.*, Vol. 18, 1916–17, pp. 2–74). A letter addressed by Sturt to the Under Secretary of the Colonial Office (R. W. Hay) and bearing the date 1834 was printed for the first time in the *Proceedings* (Vol. 18, 1916–17, pp. 89–104). Sturt pointed out the relative advantages and disadvantages of Port Lincoln and Kangaroo Island for prospective settlements and suggested that the strip of country between Mt. Lofty and the eastern shore of the Gulf of St. Vincent offered the most suitable site for the capital of a future colony. This was the site chosen only two years later by Colonel Light, to whom had been assigned the duty of selecting a location for the capital, and here the city of Adelaide was built. A well written account of the work of Sturt, Colonel Light, and other explorers of the coasts and interior of South Australia is given by Gwenneth Williams in a monograph entitled "South Australian Exploration to 1856" (Adelaide, 1919).

In spite of the construction of the telegraph line along the shore in 1877, Nuyts' Land of the Dutch (including the barren Nullarbor Plain, which, it would seem, is characterized by *karst* topography) remained only imperfectly known until as late as the opening of the transcontinental railway in 1917. One result of the popular interest in this district created by the building of the railway, was the publication in the *Proceedings* (Vol. 19, 1917–18, pp. 109–153), in the *Victorian Geographical Journal* (Vol. 30, 1913, pp. 1–17), and elsewhere, of many interesting data on explorations made there since 1860.

Among the more critical problems that face the Australian settlers after the preliminary reconnaissance of the country, is that of the removal of stock overland to remote quarters which it is hoped to develop for grazing. In 1838 Joseph Hawdon drove the first herd of horned cattle from New South Wales to Adelaide, a distance of over seven hundred miles, and was soon followed in the same undertaking by the explorers Sturt and Eyre. Letters describing these "overlanding" journeys of Hawdon, Eyre, and Sturt which first appeared in the *South Australian Gazette* in 1838 were reprinted in the *Proceedings* (Vol. 17, 1915–16, pp. 99–107). Since these early days numerous other "overlanding" expeditions have been carried out, often against desperate odds—as, for example, in the case of Kennedy and McGill who succeeded (1870) in driving a small flock of sheep westward around the head of the Great Australian Bight to the Nullarbor Plain (see *Victorian Geogr. Journ.*, Vol. 30, 1913, p. 3). Within very recent years a stock route has been opened from Willuna in Western Australia northeastward through more than six hundred miles of territory that had remained

almost utterly unknown until Canning's journey of 1907 (see *Western Australia Geol. Survey Bull. No. 61*, pp. 37 and 67–68).

PHYSICAL GEOGRAPHY

The Abyss of Cap-Breton, Bay of Biscay, and a New Explanation of the Origin of Submarine Trenches. Under the title of "Le Gouf de Cap-Breton," Commandant Ch. Gorceix presents in *La Géographie* for April, 1922, a somewhat detailed description and a novel explanation for the trench or abyss which leads an arm of deep water into the Gulf of Gascony at the inner angle of the Bay of Biscay. This trench has usually been interpreted in the same way as the apparently similar trenches opposite the mouth of the Hudson and many other rivers, as a continuation of a river valley that was eroded during a time of continental emergence, and drowned by recent submergence. Hull, Spencer, and Davidson have treated this problem for the western coast of Europe, the eastern coast of North America, and the coast of California. Gorceix gives a detailed contour map of the Cap-Breton trench, from which it appears to have a form of much irregularity, quite unlike that of a normal valley; and he explains the trench as the result of solution of submarine beds of gypsum and salt by warm water fed by a subterranean river that flows westward along a belt line from the northern flank of the Pyrenees. In support of this explanation he refers to the geological structure of the region and quotes a record of warm water discovered in the trench bottom by a temperature sounding, but he adds that further soundings are needed before the presence there of warm water in considerable volume can be regarded as proved. In response J. B. Charcot has come forward with a note to the French Academy of Sciences (*Comptes Rendus*, No. 19, May 8, 1922, pp. 1246–1247) giving soundings made by the *Pourquoi Pas* in June, 1913, and July, 1914. These soundings show an absolutely regular and normal decrease in temperature as the bottom is approached.

The amount of continental emergence and submergence demanded by the explanation of these submarine trenches as river valleys is in some cases as much as 5,000 or 8,000 feet, and that alone makes the explanation seem improbable. If the emergence and submergence are explained as the result of an up-warping and down-warping of the submarine shelf, marginal to the continent, instead of as the result of a massive and uniform movement of an entire continent, the explanation might be regarded as less strained. But if other trenches are found to exhibit such irregularities as those which characterize the abyss of Cap-Breton, it may be advisable to explain them all as of submarine origin, without the aid of changes of level. In that case the relation often found between offshore trenches and on-shore rivers would have to be regarded as accidental; yet in several instances this relation is so close as to seem causal. The whole problem is evidently open rather than closed.

W. M. Davis

GEOGRAPHICAL NEWS

Establishment of an International Hydrographic Bureau. A new evidence of international co-operation in matters of scientific interest and world-wide utility is to be found in the organization last year of an International Hydrographic Bureau situated at Monaco and supported by the governments of twenty-two maritime countries. By this step taken by the official hydrographic services of the various governments a number of aspects of the oceans and coasts now for the first time has become the subject of organized international co-operation. Official collaboration in such matters in the past has been limited chiefly to the exchange of charts by the leading national hydrographic offices. Men of science for a number of years have worked together in the study of oceanography in its biological and in many of its physical aspects. Thus the International Council for the Study of the Sea has been in existence since 1901 and has conducted a number of valuable researches. International oceanographical congresses have been held on several occasions since 1899; while the Prince of Monaco, largely by his own effort, has succeeded in compiling the uniform bathymetric chart of the oceans, thus utilizing the data of many governments; and it would seem to bode well for the contact of the new Bureau with oceanographers in general that the seat selected for it is Monaco.

From now onwards the principle is established that all information about the coasts and the oceans gathered by official departments is to become available to all other similar departments which adhere to the International Hydrographic Bureau, and the adherents are to have an opportunity for open discussion at a conference every fifth year.

The author of the idea was the late Joseph Renaud, Director of the French Hydrographic Service. At a preliminary conference held in London in 1919 a committee consisting of M. Renaud and the Hydrographers of Great Britain and the United States began its labors of organization, and within a year practically all the invited States had approved of their recommendations.

The main objects of the Bureau are to co-ordinate the efforts of the various Hydrographic Services with a view to rendering navigation easier and safer on all the seas, to obtain as much uniformity in hydrographic documents as possible, and to advance the theory and practice of hydrography. The Bureau has no authority over the national Hydrographic Offices; it is a consultative body. Its functions may be summarized as follows:

The maintenance of up-to-date collections of charts and other documents issued by the various Hydrographic and Meteorological Services, together with the preparation of a list of such hydrographic documents as are of historical interest, and their whereabouts.

Study and research upon all subjects which affect hydrography, including instruments and survey methods.

Publication of various lists such as those of geographical positions, and the distribution of information regarding new surveys, etc.

Advice, when asked for, which will aid governments in establishing Hydrographic Offices, or in developing those already established.

The Bureau has unfortunately been deprived, by his death, of the further services of M. Renaud on its Directing Board. This Board, elected for five years, consists of Vice-Admiral Sir John Parry (Great Britain), President, and representatives from the Netherlands and Norway. The address of the Bureau Hydrographique International is 3 rue du Port, Monaco, and the Secretary-General is Captain G. Spicer-Simson (*Geogr. Journ.*, April, 1922).

Obituary

Thorvaldur Thoroddsen. The well-known Icelandic geographer and geologist, Thorvaldur Thoroddsen, died in Copenhagen on September 30, 1921, after an illness of several months. He was born in Iceland on June 6, 1855, and studied in the universities of Copenhagen and Leipzig. For many years he was teacher in the College of Reykjavik until 1899, when he moved to Copenhagen and devoted himself to research and writing. As a young student he accompanied in 1876 Professor Johnstrup on his expedition to investigate the Icelandic volcano Askja, and this directed Thoroddsen to what became the task of his life. He realized how imperfect was existing knowledge about the nature of his native land, and in 1881 he began exploring it; with public and private support he continued this exploration often under great difficulties almost every summer until 1898, having then visited all parts of the country. The results of these explorations he published from time to time in various Icelandic and foreign periodicals. In 1900 appeared his geological map of Iceland, a few years later his important descriptive work, "Island: Grundriss der Geographie und Geologie" (*Petermanns Mitt. Ergänzungsheft No. 152*, 1905, and *No. 153*, 1906). "An Account of the Physical Geography of Iceland with Special Reference to the Plant Life" appeared in 1914 as a part of "The Botany of Iceland." He was a prolific writer, and in Icelandic there are several large works from his pen, such as a history of Icelandic geography (in four volumes, the first two of which were translated into German); on earthquakes in Iceland; on the climate of Iceland during the last thousand years; an account of his explorations and travels (in four volumes); a comprehensive description of Iceland, which he left unfinished, four volumes having appeared at the time of his death; and many other smaller writings. His most important contributions to science were his writings on volcanism. When he began his explorations only about 30 volcanoes were known in Iceland, but he found there at least 130. No one had so varied and wide knowledge about his native land as Thoroddsen; he was a historian as well as naturalist. He was an attractive personality, a cultured and widely read man with many interests. In recognition of his work he received many honors. In 1894 the University of Copenhagen made him a doctor *honoris causa*, and in 1909 he was elected member of the Danish Royal Academy. In 1906 he received the Daly medal of the American Geographical Society and he also held gold medals from the geographical societies of Copenhagen and Paris and the Linné medal of Stockholm. He was honorary member of several scientific societies.

H. Hermannsson